

Service Manual

Cassette Deck

RS-M65

FG Servo Controlled Direct-Drive Flat Type Cassette Deck

(Black Face)
(Silver Face)

This is the Service Manual for the following areas.

- ☐.....For All European areas except United Kingdom.
- ☐.....For United Kingdom.
- ☐.....For Asia, Latin America, Middle East and Africa areas.
- ☐.....For Australia.
- ☐.....For PX.

RS-M85 MECHANISM SERIES

Specifications

Power requirements: AC; 110/125/220/240V, 50-60Hz
(not necessary For conversion)
Preset power voltage: 220V for Europe except England, 240V for England and Australia

Power consumption: 30W (for All European areas and Australia)
27W (for Asia, Latin America, Middle East, Africa areas PX)

Motors: 2-motor system
Brushless FG servo controlled direct-drive motor for capstan drive
1-DC coreless motor for reel-table drive

Track system: 4-track 2-channel stereo recording and playback

Tape speed: 4.8cm/s (1-7/8ips)

Wow and flutter: 0.035% (WRMS), $\pm 0.10\%$ (DIN)

Frequency response: CrO₂/Fe-Cr tape; 20~18,000Hz
30~18,000Hz (DIN)
30~16,000Hz ± 3 dB
Normal tape; 20~16,000Hz
30~16,000Hz (DIN)
30~14,000Hz ± 3 dB

Signal-to-noise ratio: Dolby* NR in; 69dB above 5kHz)
Dolby NR out; 59dB
(signal level=max. recording level, Fe-Cr/
CrO₂ type tape)

Fast forward and
rewind time: Approx. 80 seconds with C-60 cassette tape

Inputs: MIC; sensitivity 0.25mV, input impedance 47K Ω
applicable microphone impedance 400 Ω ~
10K Ω

Output: LINE; sensitivity 60mV, input impedance 56K Ω
LINE; output level 700mV, load impedance
22K Ω over
HEADPHONE; output level 75mV, load
impedance 8 Ω

Rec/pb connection: 5P DIN type; input sensitivity 0.25mV,
impedance 6.4K Ω output level 700mV,
impedance 1.5K Ω

Heads: 2-head system
1-SX (Sendust Extra) head for record/playback
1-double-gap ferrite head for erasure

Bias frequency: 85kHz

Dimensions: 43cm(W) \times 9.7cm(H) \times 34.7cm(D)
[16-7/8"(W) \times 3-7/8"(H) \times 13-5/8"(D)]

Weight: 7.1kg (15lbs 11oz)

Specifications are subject to change without notice.

* 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

LOCATION OF CONTROLS AND COMPONENTS

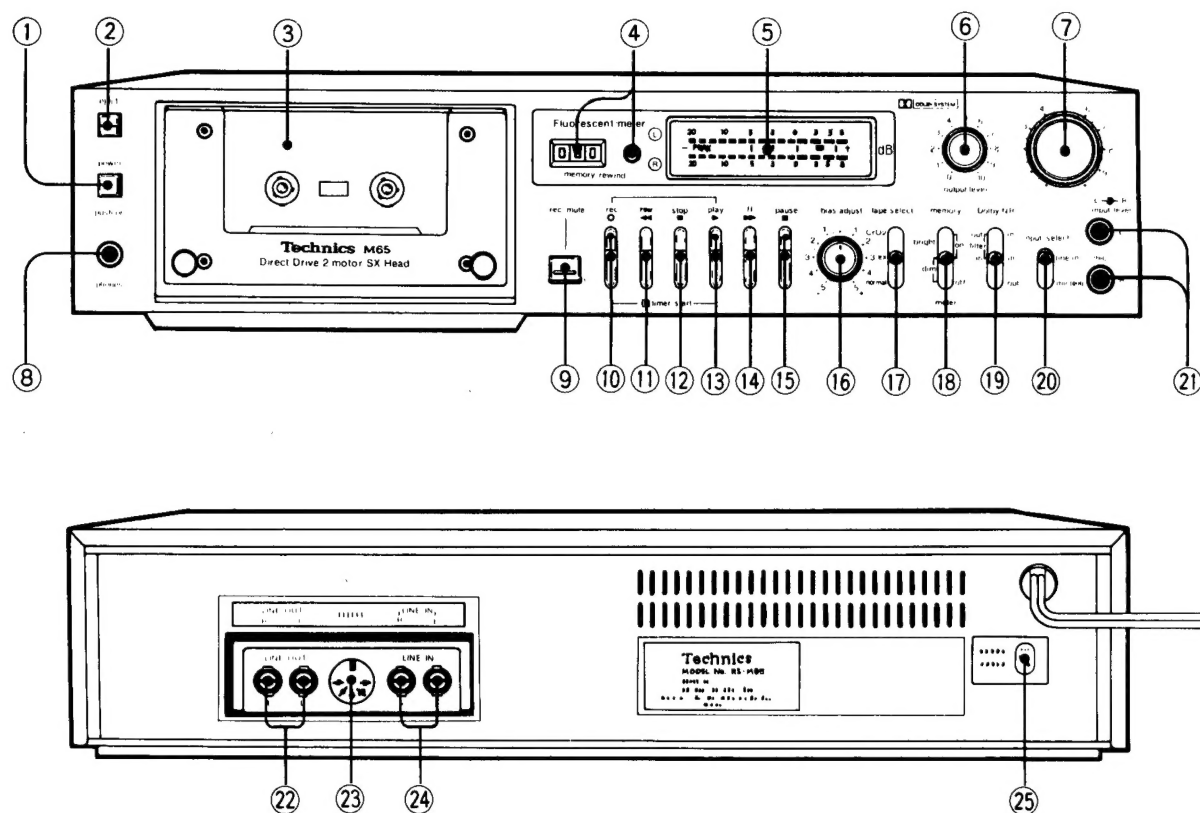


Fig. 1

- | | |
|---|---|
| ① Power switch | ⑭ Fast-forward button |
| ② Eject button | ⑮ Pause button with pause indication lamp |
| ③ Cassette holder | ⑯ Bias-adjustment control |
| ④ Tape counter and reset button | ⑰ Tape selector |
| ⑤ FL (Fluorescent Level) Meters | ⑱ Memory/meter-brightness switch |
| ⑥ Output level control | ⑲ Dolby noise-reduction switch |
| ⑦ Input level controls | ⑳ Input selector |
| ⑧ Headphones jack | ㉑ Microphone jacks |
| ⑨ Record-muting switch | ㉒ Line output jacks |
| ⑩ Record button with record indication lamp | ㉓ Record/playback connection socket |
| ⑪ Rewind button | ㉔ Line input jacks |
| ⑫ Stop button | ㉕ Voltage selector |
| ⑬ Playback button with playback indication lamp | |

DISASSEMBLY INSTRUCTIONS

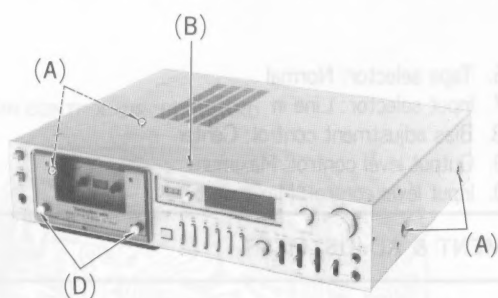


Fig. 2

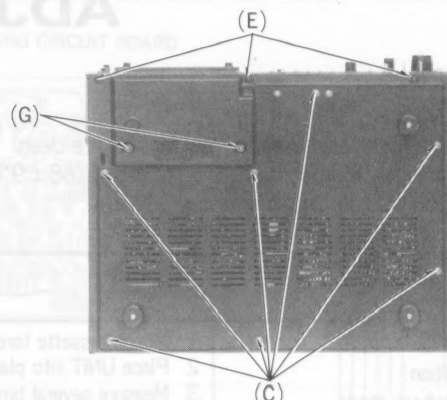


Fig. 3

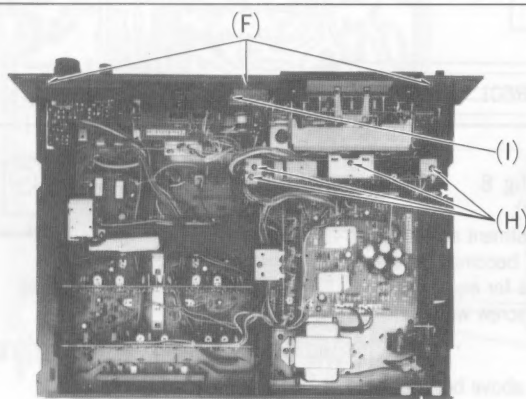


Fig. 4

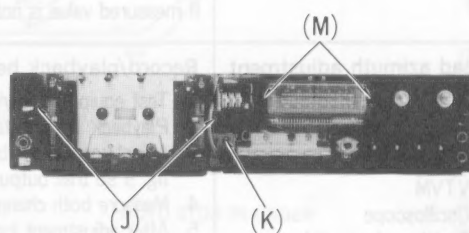


Fig. 5

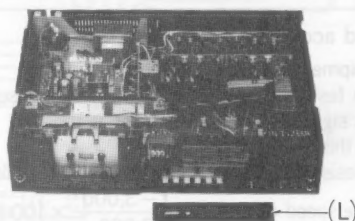


Fig. 6

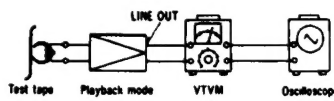
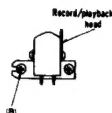

Procedure	To remove —	Remove —	Shown in fig. —
1	Case cover	• 4 screws(A) • 1 screw(B)	2 2
2	Bottom cover	• 7 red screws(C)	3
3	Front panel	• 2 cassette lid holding screws(D)※ • 3 screws(E) • 3 red screws(F)	2 3 4
4	Mechanism	• 2 red screws(G) • 4 red screws(H) • Red screw(I) • 2 red screws(J) • Metal screw(K)	3 4 4 5 5
5	FL level meter	• Meter cover(L) • 2 meter holders(M)	6 5

※The head azimuth can be adjusted by removing the cassette lid.

MEASUREMENT AND ADJUSTMENT METHODS

NOTE:

1. Make sure heads are clean.
2. Make sure capstan and pressure roller are clean.
3. Judgeable room temperature: $20 \pm 5^\circ\text{C}$ ($68 \pm 9^\circ\text{F}$)
4. Meter selector: Peak, dim
5. Dolby NR switch: OUT
6. Tape selector: Normal
7. Input selector: Line in
8. Bias adjustment control: Center
9. Output level control: Maximum
10. Input level control: Maximum

ITEM	MEASUREMENT & ADJUSTMENT
Takeup tension Condition: • Playback mode Equipment: • Cassette torque meter ... QZZSRKCT	<ol style="list-style-type: none"> 1. Mount cassette torque meter on UNIT. 2. Place UNIT into playback mode and read takeup torque. 3. Measure several times and determine the mean value. <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> Standard value: $45 \pm 15 \text{ gr-cm}$ </div> <p>Adjustment method If measured value is not standard, adjust VR601.</p>
Head azimuth adjustment Condition: • Playback mode Equipment: • VTVM • Oscilloscope • Test tape (azimuth) ... QZZCFM • Tape path viewer ... QZZCRD	<p>Record/playback head adjustment</p> <ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 8. 2. Playback azimuth tape (QZZCFM 8kHz). 3. Adjust record/playback head angle adjustment screw (B) in fig. 9 so that output level at LINE OUT becomes maximum. 4. Measure both channels, and adjust levels for equal output. 5. After adjustment lock head adjustment screw with lacquer. <div style="text-align: center;">  <p>Fig. 8</p> </div> <p>Erase head adjustment</p> <ol style="list-style-type: none"> 1. Test equipment connection is the same above but use the tape path viewer (QZZCRD) instead of test tape (QZZCFM). 2. Playback this tape. 3. Adjust screw (C) shown in fig. 10 so that the tape may not get curled or malformed by tape guide of the erase head. 4. After adjustment, lock head adjust screw with lacquer. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Fig. 9</p> </div> <div style="text-align: center;">  <p>Fig. 10</p> </div> </div>
Tape speed Condition: • Playback mode Equipment: • Digital electronic counter • Test tape ... QZZCWAT	<p>Tape speed accuracy</p> <ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 11. 2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter. 3. Measure this frequency. 4. On the basis of 3,000Hz, determine value by following formula: $\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100 (\%)$ where, f = measured value 5. Take measurement at middle section of tape. <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> Standard value: $\pm 0.4 \%$ </div> <p>Adjustment method</p> <ol style="list-style-type: none"> 1. Playback the test tape (middle). 2. Adjust tape speed adjustment VR701 so that frequency becomes 3,000Hz. <p>Tape speed fluctuation Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 100 (\%)$ $f_1 = \text{maximum value}, f_2 = \text{minimum value}$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> Standard value: Less than 0.3% </div>

ITEM	MEASUREMENT & ADJUSTMENT
Capstan motor circuit adjustment	<p>Standard DC power supply voltage adjustment</p> <ol style="list-style-type: none"> 1. Measure the DC voltage between ⑤ terminal of IC701 and ground as shown in fig. 12. <div data-bbox="533 383 858 427" style="border: 1px solid black; padding: 2px; text-align: center;"> Standard value: $11 \pm 0.05V$ </div> <ol style="list-style-type: none"> 2. If measured voltage is not within standard, adjust VR702. <div data-bbox="1150 286 1331 439" style="text-align: center;"> <p>Fig. 12</p> </div>
Playback frequency response Condition: • Playback mode • Output level control ... MAX Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	<ol style="list-style-type: none"> 1. Test equipment connection is as same as "Head azimuth adjustment" but use the test tape (QZZCFM) instead of head azimuth tape (See fig. 8). 2. Place UNIT into playback mode. 3. Playback the frequency response test tape (QZZCFM). 4. Measure output level at 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart. 7. If measured value is not in standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 24). <div data-bbox="895 524 1406 725" style="text-align: center;"> <p>Playback frequency response chart</p> <p>Fig. 13</p> </div>
Playback gain Condition: • Playback mode • Output level control ... MAX Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	<ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 8. 2. Playback standard recording level portion on test tape (QZZCFM 315Hz), and using VTVM measure the output level at LINE OUT jack. 3. Make measurement for both channels. <div data-bbox="533 1010 884 1055" style="border: 1px solid black; padding: 2px; text-align: center;"> Standard value: $0.66 \pm 0.05V$ </div>
Playback S/N ratio Condition: • Playback mode • Output level control ... MAX Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM • Empty cassette	<ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 8. 2. Playback standard recording level test tape (QZZCFM 315Hz) and read output level on VTVM. Refer to "Playback gain adjustment". 3. Place empty cassette (which has been cut) and playback again. 4. Measure noise level at this time using VTVM, and determine ratio of this level to test tape output signal voltage (315Hz). <div data-bbox="533 1294 943 1339" style="border: 1px solid black; padding: 2px; text-align: center;"> Standard value: Greater than 47dB </div>
Bias leak Condition: • Record mode • Input level control ... MAX Equipment: • VTVM • Oscilloscope	<ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 14. 2. Place UNIT into record mode. 3. Adjust trap coils L1 (L-CH), L2 (R-CH), so that measured value become minimum (See fig. 24). 4. Make adjustment for both channels. <div data-bbox="1102 1368 1422 1536" style="text-align: center;"> <p>Fig. 14</p> </div>
Bias current Condition: • Record mode • Bias adjustment control ... Center Equipment: • VTVM • Oscilloscope	<ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 15. 2. Place UNIT into record mode, and tape selector to normal position. 3. Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10\Omega}$ <div data-bbox="533 1787 900 1832" style="border: 1px solid black; padding: 2px; text-align: center;"> Standard value: About 0.40mA </div> <ol style="list-style-type: none"> 4. If measured value is not in standard, adjust L1 (L-CH), and L2 (R-CH). 5. Then changing the tape selector to Fe-Cr position measure the bias current. <div data-bbox="1082 1630 1406 1760" style="text-align: center;"> <p>Fig. 15</p> </div>

ITEM	MEASUREMENT & ADJUSTMENT
	<p style="text-align: center;">Standard value: About 0.48 mA</p> <p>6. Change the tape selector to CrO₂ position, measure the bias current.</p> <p style="text-align: center;">Standard value: About 0.57 mA</p>
<p>Erase current</p> <p>Condition:</p> <ul style="list-style-type: none"> Record mode <p>Equipment:</p> <ul style="list-style-type: none"> VTVM Oscilloscope Resistor (1Ω) 	<ol style="list-style-type: none"> Connect 1Ω resistor between ground side terminal of erase head ground lead wire removed (See fig. 16). Connect VTVM to both ends of 1Ω resistor. Place UNIT into record mode, and measure voltage across the 1Ω resistor. Determine erase current with the following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of } 1\Omega}{1\Omega}$ <p style="text-align: center;">Standard value: 60 ± 15 mA (bias selector ... low)</p>
<p>Overall gain</p> <p>Condition:</p> <ul style="list-style-type: none"> Record/playback mode Input level control ... MAX Standard input level: <ul style="list-style-type: none"> MIC -72 ± 3 dB LINE IN ... -24 ± 3 dB DIN -36 ± 3 dB Bias adjustment control ... Center Output level control ... MAX <p>Equipment:</p> <ul style="list-style-type: none"> AF oscillator Oscilloscope Test tape (reference blank tape) VTVM ATT <p>... QZZCRA for Normal ... QZZCRX for CrO₂ ... QZZCRY for Fe-Cr</p>	<ol style="list-style-type: none"> Test equipment connection is shown in fig. 18. Place UNIT into record mode. Supply 1kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN. Adjust ATT until monitor level at LINE OUT becomes 0.66 V. Using test tape, make recording. Playback recorded tape, and measure the output level at LINE OUT on VTVM. If the measured value increases, connection points for R93, R94 (Fe-Cr) or R97, R98 (CrO₂) should be shorted. If the measured value decreases, connection points for R91, R92 (Fe-Cr) or R95, R96 (CrO₂) should be unsoldered. <p style="text-align: center;">Standard value: 0.66 ± 0.05 V (Normal position), 0.66 ± 1.5 dB (Fe-Cr position, CrO₂ position)</p>
<p>Fluorescent meter</p> <p>Condition:</p> <ul style="list-style-type: none"> Record mode Input level control ... MAX Output level control ... MAX Tape selectors ... Normal position <p>Equipment:</p> <ul style="list-style-type: none"> VTVM AF oscillator ATT 	<ol style="list-style-type: none"> Test equipment connection is shown in fig. 18. Set the meter function selector to the "bright" position. Supply 1kHz signal (-24 dB) to the LINE IN jack, then press the record button. Adjust the ATT so that the output level at LINE OUT jack becomes 0.66 V (= standard input level). Adjustment at "0 dB": <ol style="list-style-type: none"> Adjust VR301 (L-CH) and VR302 (R-CH) so that the Fluorescent meters show an illuminated indication up to "0 dB" when the input signal level is 0.9 dB higher than the standard input level. Then confirm that the Fluorescent meters show an illuminated indication up to "+1 dB" when the input signal level is 1 dB higher than the standard input level. Adjustment at "-20 dB": <ol style="list-style-type: none"> Adjust VR303 (L-CH) and VR304 (R-CH) so that the Fluorescent meters show an illuminated indication up to "-20 dB" when the input signal level is 15.1 dB lower than the standard input level. Then confirm that the Fluorescent meters show an illuminated indication up to "-15 dB" when the input signal level is 15 dB lower than the standard input level. Repeat twice between steps 3 and 6 above.

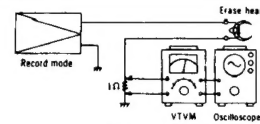


Fig. 16

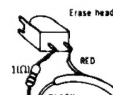


Fig. 17

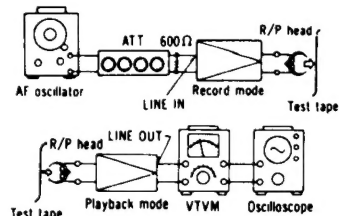


Fig. 18

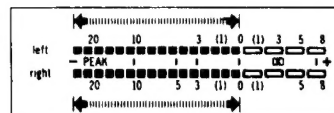


Fig. 19

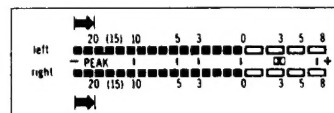


Fig. 20

ITEM	MEASUREMENT & ADJUSTMENT
Overall S/N ratio Condition: • Record/playback mode • Input level control ... MAX • Erase the tape with a bulk tape eraser. • Output level control ... MAX • Bias adjustment control ... Center Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Test tape (reference blank tape) ... QZZCRA	<ol style="list-style-type: none"> 1. Test equipment connection is shown in fig. 18. 2. Supply 1kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.66V. 3. Make recording. 4. Make another recording without supplying signal (disconnect input plug to LINE IN). 5. Rewind to recorded part and playback. 6. Measure output signal level and no signal level (noise), and determine the ratio in decibels (dB). 7. The value is difference between "Playback S/N and overall S/N", but for decibel calculation refer to "Playback S/N ratio". <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Standard value: Greater than 45dB (without NAB filter) </div>

ADJUSTMENT PARTS LOCATION

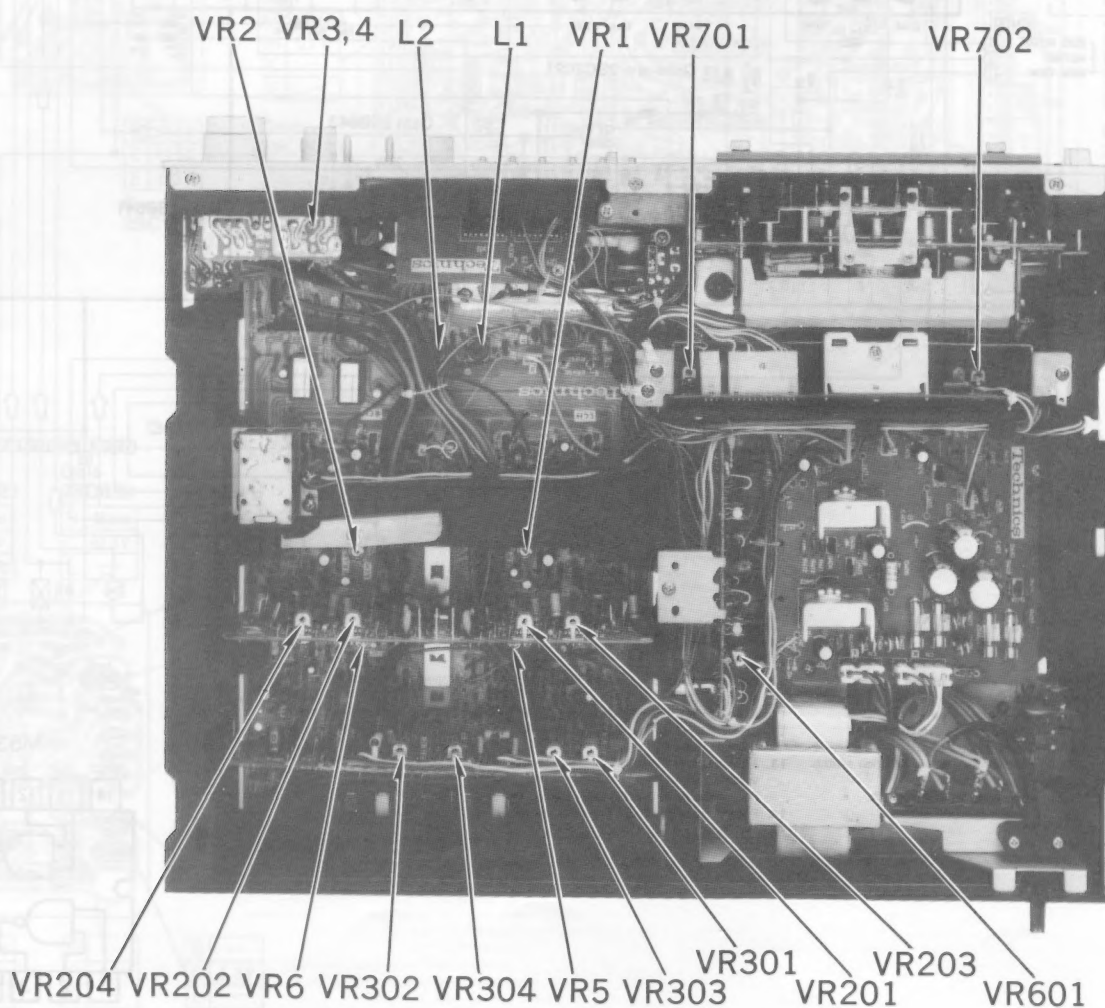
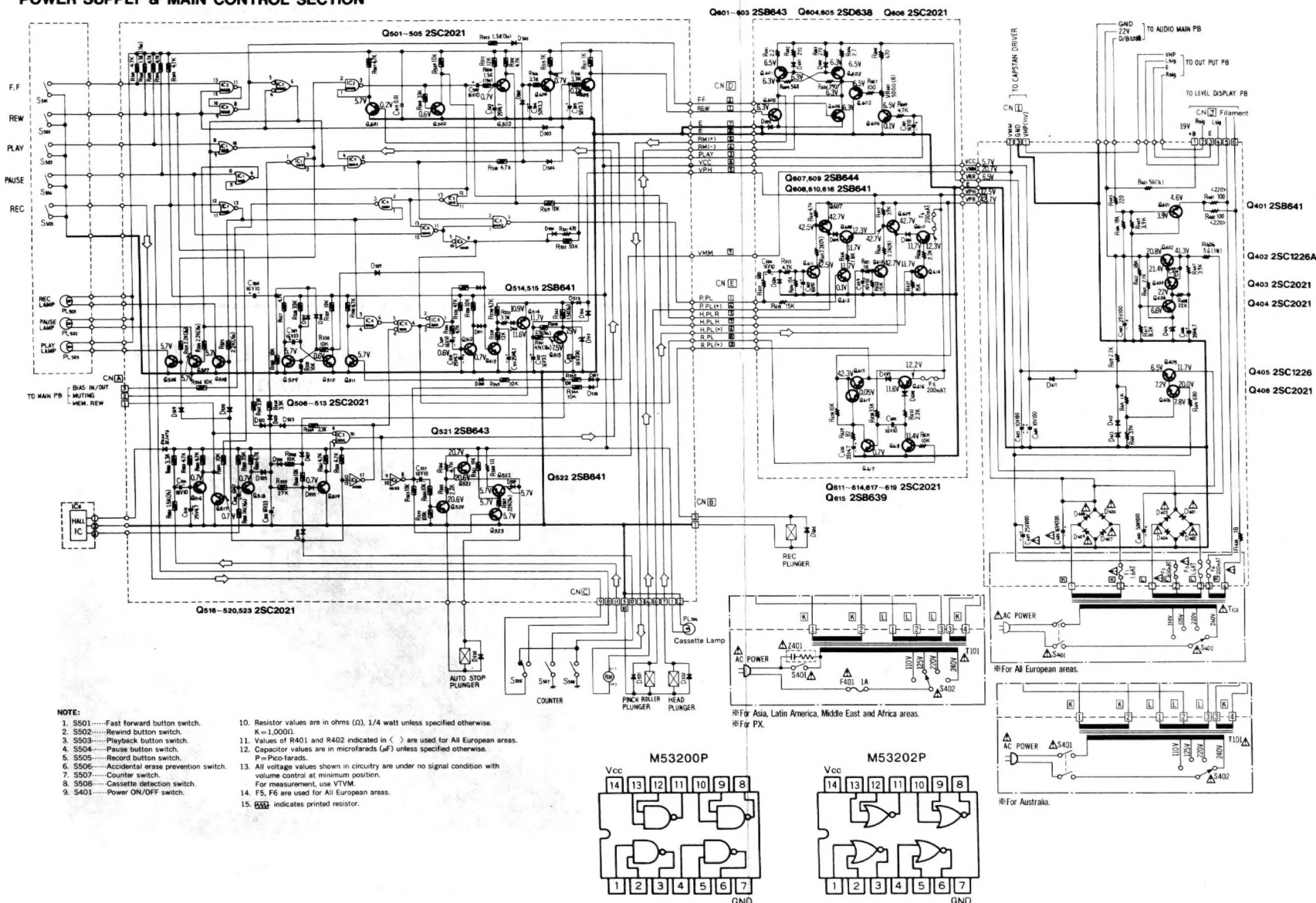


Fig. 24

SCHEMATIC DIAGRAM

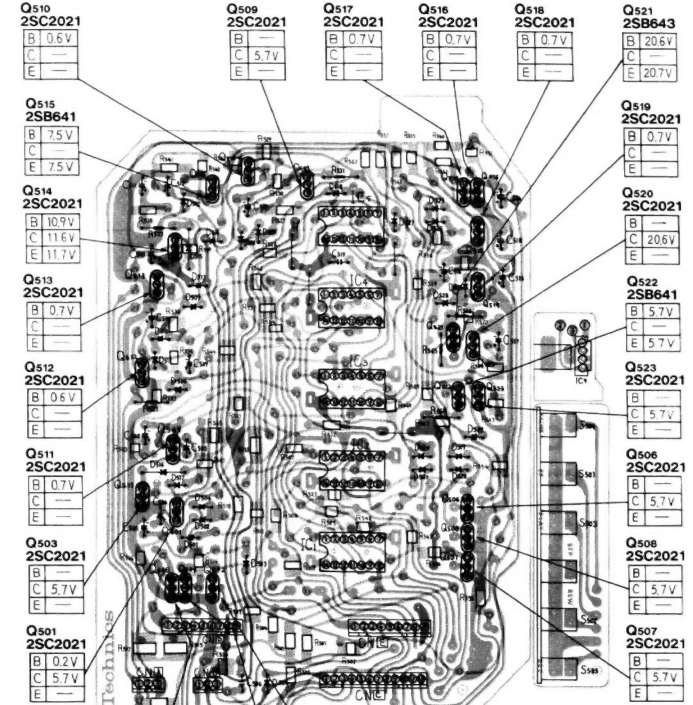
POWER SUPPLY & MAIN CONTROL SECTION



[illegible]

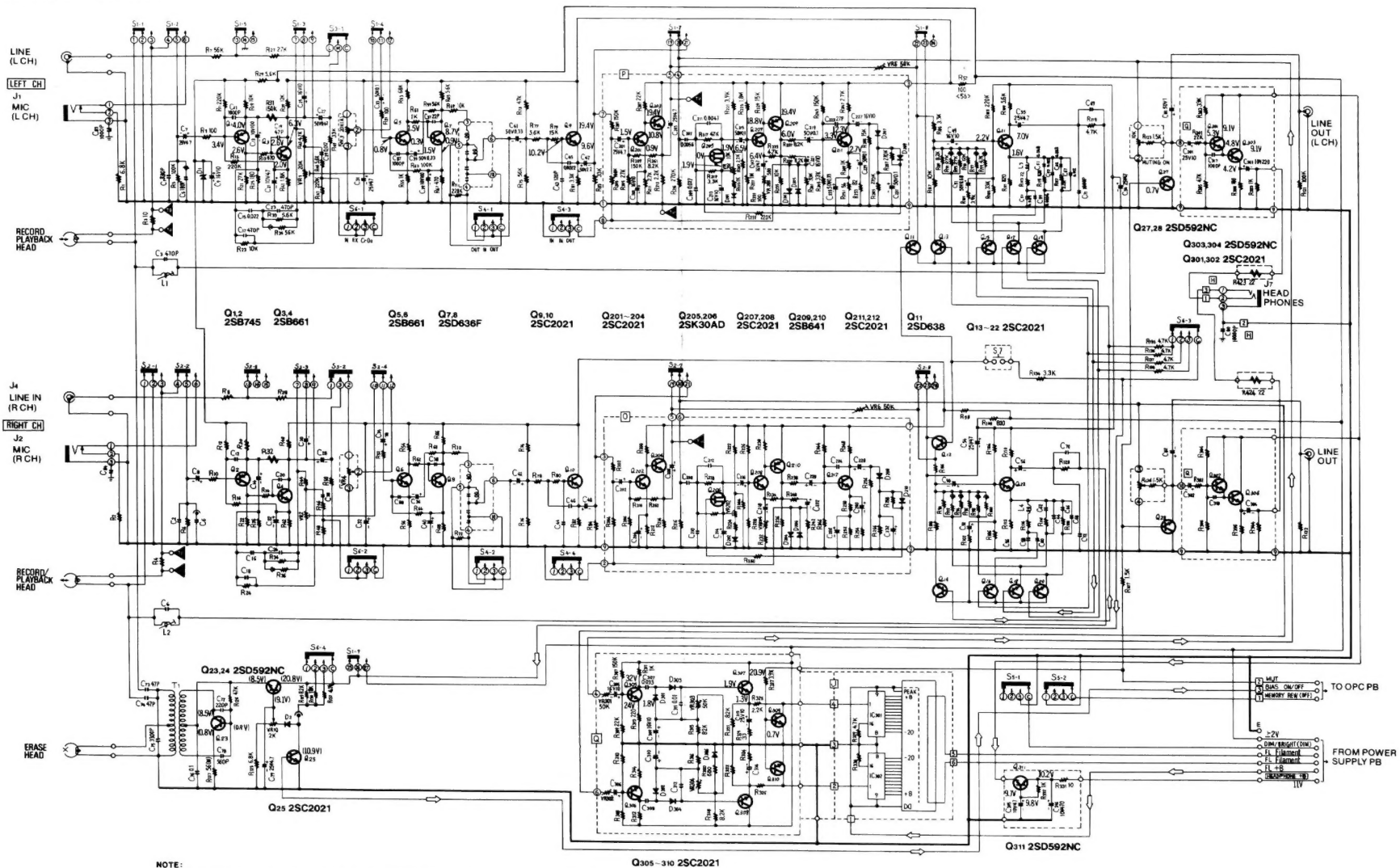
Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.
V7601, 302, 303, 304		C311, 312		Q305, 306, 307, 308, 309, 310		D1	
EVNKA00B54			EQQM05103KZ		25C945		
V7601, 303, 304		C313, 314		Q401	25C1383		
EVNKA00B53			ECEA1HS100		25A564		
V7701		C315	ECEA1AS470	Q402	25C1226		
			ECEA1AS471	Q403, 404	25C945		
V7702	EVNKA00B13	C401	ECEA1HS471				
CAPACITORS							
C1, 2	ECCD1H33K1	C402	ECEA1HS102	Q405	25C1226		
C3, 4	EQCS1471JZ	C403	ECEA1CS102	Q406, 501, 502, 504, 505,			
C5, 6	ECCD1H18K1	C404	ECEA1AS472	506, 507, 508, 509, 510, 511,			
C7, 8	ECEA25M47R	405, 406	ECEA1AS471	512, 513			
C10	ECEA1HS100		ECEA1AS101		25C945		
C11, 12	EQQM05100KZ	C407	ECEA1HS470	Q514, 515	25A719		
C13, 14	ECEA10M100	C408	ECEA1VS102	Q516, 517, 518, 519, 520			
C15, 16	EQQM0523JZ	C410	EQQM0510AMZ		25C945		
C17, 18	ECCD1H471K	C502	ECEA1HS100	Q521	25A719		
C19, 20	ECCD1H470K			Q522	25A719		
		C503		Q523	25C945		
C21, 22	ECEA1AS470	504, 505		Q601, 602, 603			
C23, 24	ECCD1H71K		ECEA502R33		25A719		
C25, 26	ECEA1HS100		ECEA1AS470	Q604, 605	25C945		
C27, 28	ECEA50M47R	C507	ECEA1CS130		25C1317		
C29, 30	EQQM0512KZ	C509	ECEA1HS100		25C945		
C31, 32	ECEA1ES470	510, 511					
C33, 34	ECEA50M47R		ECEA25A707	Q607	25A720		
C35, 36	ECEA502R33	C512	ECEA1CS130	Q608	25A719		
C37, 38	ECCD1H200K	C513	ECEA1CS331	Q609	25A720		
C39, 40	ECEA1ES101	C514	ECEA1HS100	Q610			
		C515	ECEA1AS470		25A885		
C41, 42	ECEA502R33				For All European parts.		
C43, 44	ECCD1H121K	C516	ECEA1CS330				
C45, 46	EQQM0512KZ	C517	ECEA1HS100		For Asia, Latin America,		
C47, 48	ECEA502R27	C518	ECEA25A7R		Middle East, Africa, areas,		
C49, 50	ECEA1HS100	C519	EQM01H103ZF		Australia and P.X.		
C51, 52	ECEA502R68	600, 601, 602, 604, 605			Q611, 612, 613, 614		
C53	ECEA1ES470		ECEA1HS100		25C945		
C55, 56	ECEA502R27	C606	ECEA25A7R	Q615	25C1318		
C57, 58	EQQM0539JZ	C701	EQQM05393KZ	Q616			
C59, 60	EQQM0556JZ	C702	EQQM05683KZ		For Asia, Latin America,		
		C703	EQQM0510AMZ		Middle East, Africa, areas,		
		C704	ECCD1H471K		Australia and P.X.		
C61, 62	EQQM0568JZ				25A885		
C63, 64	EQQM0523KZ	C705	EQQM0512KZ		For All European parts.		
C65, 66	EQQM0533KZ	C706	EQQM05182KZ		Q617, 618, 619, 620		
C67, 68	EQQM05103KZ	C707	EQQM05130KZ		25C945		
C69, 70	EQQM05320Z	C708	EQM051681JZ		25C945		
C71, 72	ECCD1H471K	C709	EQQM0522KZ	Q702, 703, 704, 705, 706, 707			
C73, 74	ECCD1H470K	C710	ECEA1ES470		25A564		
C75	EQCF633KZ	C711	EQQM05473KZ	Q708, 709, 710, 711			
C76	EQQM0510AMZ	C712	EQQM05562KZ		25A719		
C77	ECCD1H221K	C713	EQQM05473KZ				
C78	EQCS1561JZ	C714	EQCEA02R47	Q712, 713, 714, 715			
C79	ECEA25A7R				25C1846		
C81, 82	ECEA502R1	C715	EQQM0512KZ	Q716, 717, 718			
C83, 84	ECCD1H102BK				25C945		
C85, 86	EQQM0568KZ	C716	ECEA502R1	Q719, 719	25C1846		
C87, 88	ECCD1H102BK	C717, 718	ECEA501	Q720, 721	25C945		
C201, 202	ECEA25A7R	C719	ECEA1ES101				
		C720	ECCD1H152BK				
C203, 204	ECEA1HS100			INTEGRATED CIRCUITS			
C205, 206	ECEA1HS100	Z1		IC1	MS3202P		
		21	四国及 QCR0008T	IC2	MS3200P		
			For Asia, Latin America,	IC3	MS3202P		
C207, 208	EQQM0556JZ		Middle East, Africa, areas,	IC4, 5	MS3200P		
			Australia and P.X.	IC6	DN835		
C209, 210	EQQM0527JZ			IC301, 302	QVBA658		
					AN660		
C211, 212	EQQM0547JZ	Q1, 2	25A721	IC701	QVBA658		
C213, 214	ECEA1HS100	Q3, 4, 5, 6	25C1327		AN660		
C215, 216	ECEA1HS100	Q7, 8	25C945		DIODES		
C217, 218	ECEA50M47R	Q9, 10	25C945	D1	MA1051		
C219, 220	ECEA1HS100	Q11, 12	25C1317	D2	152473		
C221, 218	ECEA1ES470	Q13, 14, 15, 16, 17, 18, 19, 20,	25C945	D201, 202		0A90	
C222, 220	ECEA502R1	21, 22	25C945		25A719		
		Q23, 24	25C1383	D207, 208		0A90	
C223, 222	ECEA1HS100	Q25	25C945				
		四国及	25C945	D209, 210		152473	
C223, 224	ECCD1H270K		For Asia, Latin America,				
C225, 226	ECCD1H270K		Middle East, Africa, areas,	D301, 302, 303, 304	0A90		
			Australia and P.X.	D306	MV121		
C227, 228	EQQM052R33		For All European parts.	D401, 402, 403, 404, 405, 406,	407, 408, 409, 410, 411		
	ECEA1HS100	Q27, 28	25C1383		SM102		
		Q201, 202, 203, 204,	25C945		SM102		
				D413	MA1082		
C230, 232	ECEA502R1	Q205, 206	25K30AD	D401, 402	MA1062		
C301, 302	ECEA1HS100	Q207, 208	25C945	D501, 502, 503, 504	152473		
C303, 304	ECEA1AS221	Q209, 210		D505	SM102		
C305, 306	ECEA1HS100		25A564	D506, 507, 508, 509, 510, 511			
C307, 308	ECEA1HS100	Q211, 212, 301, 302	25C945		152473		
	EQQM05333MZ	Q303, 304	25C1383	D513, 514	MA1075		
C309, 310	ECEA1HS100				SM102		

MAIN CONTROL CIRCUIT BOARD

[illegible]

SCHEMATIC DIAGRAM

MAIN AMP SECTION

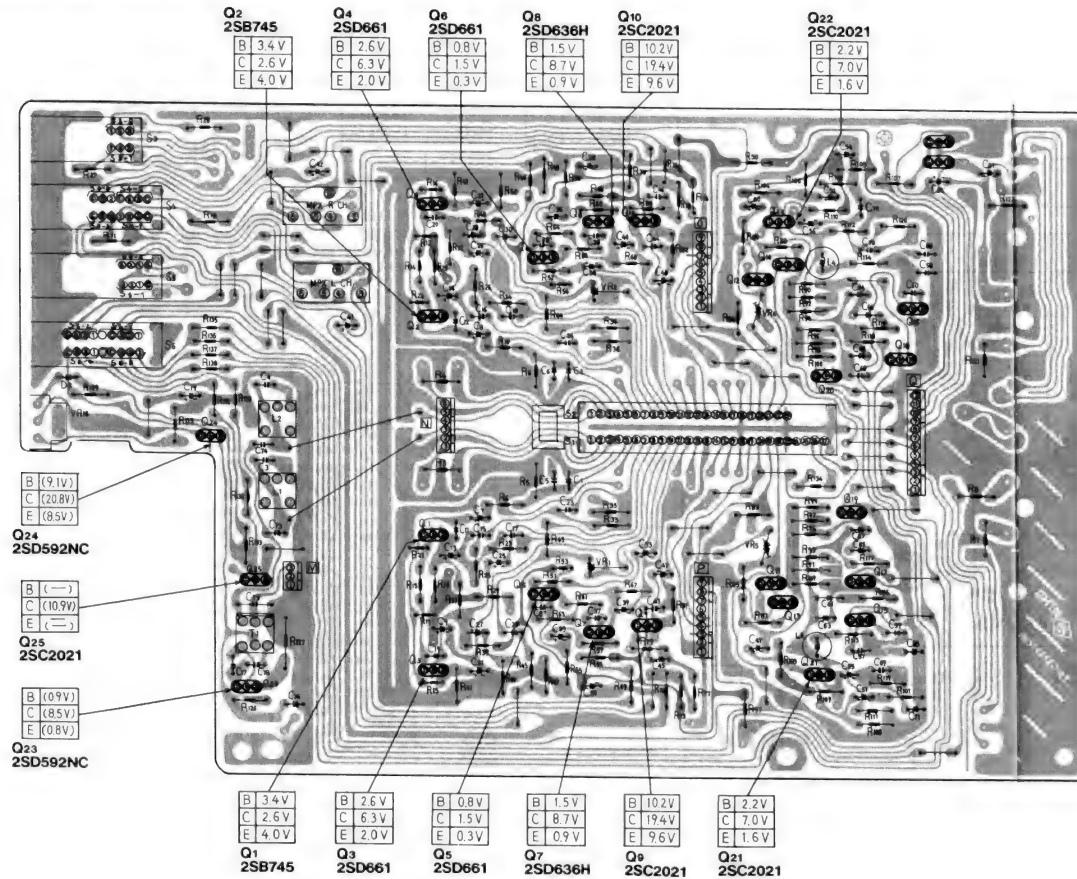


NOTE:

1. S1-1~S1-8 Record/playback select switch L-CH (shown in playback position).
2. S2-1~S2-9 Record/playback select switch R-CH (shown in playback position).
3. S3-1, S3-2 Input select switch (L- LINE IN, M- MIC).
4. S4-1~S4-4 Dolby NR switch (shown in "OUT" position).
5. S5-1, S5-2 Memory rewind switch/meter brightness select switch (shown in memory rewind OFF/meter brightness DIM position).
1- Memory rewind OFF/DIM. 2- Memory rewind ON/DIM. 3- Memory rewind ON/BRIGHT.
6. S6-1, S6-2 Tape select switch (shown in "Normal" position).
1- Normal, 2- Fe-Cr, 3- CrO₂.
7. S7 Muting switch for record and playback.
8. VR1, 2 Playback level adjustment VR.
9. VR3, 4 Input level control.
10. VR5, 6 Recording level adjustment VR.
11. VR7, 8 Output level control.
12. VR10 Bias control adjustment VR.
13. VR301, 302 Fluorescent meter adjustment VR (for 0dB).
14. VR303, 304 Fluorescent meter adjustment VR (for -20dB).
15. L1, 2 Bias leakage adjustment coil.
16. L3, 4 Recording equalizer coil.
17. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.
K=1,000 Ω .
18. Values of R57 and R58 indicated in () are used for All European areas.
19. Capacitor values are in microfarads (μ F) unless specified otherwise.
P=pico farads.
20. All voltage values shown in circuitry are under no signal condition with volume control at minimum position.
For measurement, use VTVM.
21. $\overline{R57}$ indicates printed resistor.

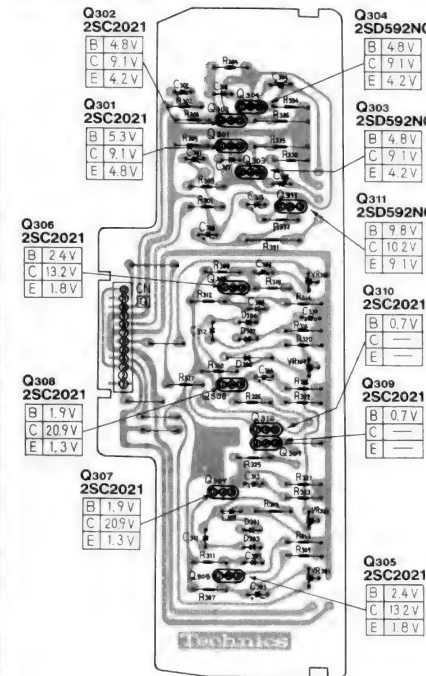
CIRCUIT BOARD

MAIN AMP CIRCUIT BOARD

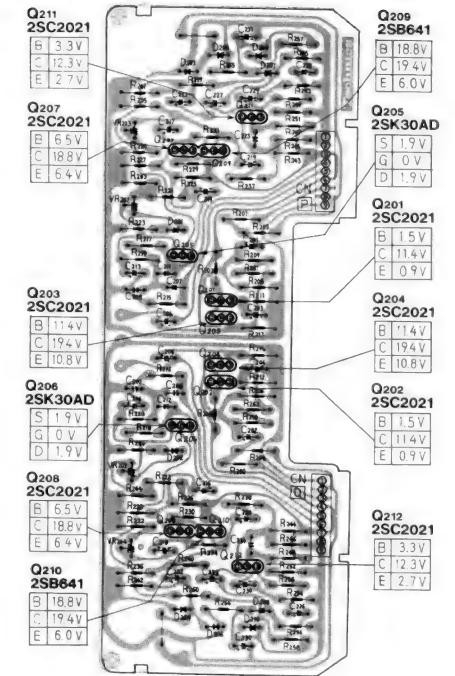


NOTE:
The circuit shown in red on the conductor is B circuit.
Values indicated in are DC voltage between the chassis and electrical parts.

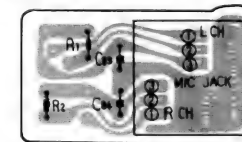
METER OUTPUT CIRCUIT BOARD



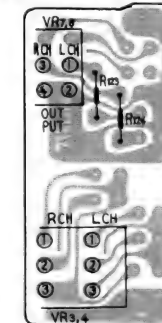
DOLBY CIRCUIT BOARD



MIC JACK CIRCUIT BOARD



VR CIRCUIT BOARD

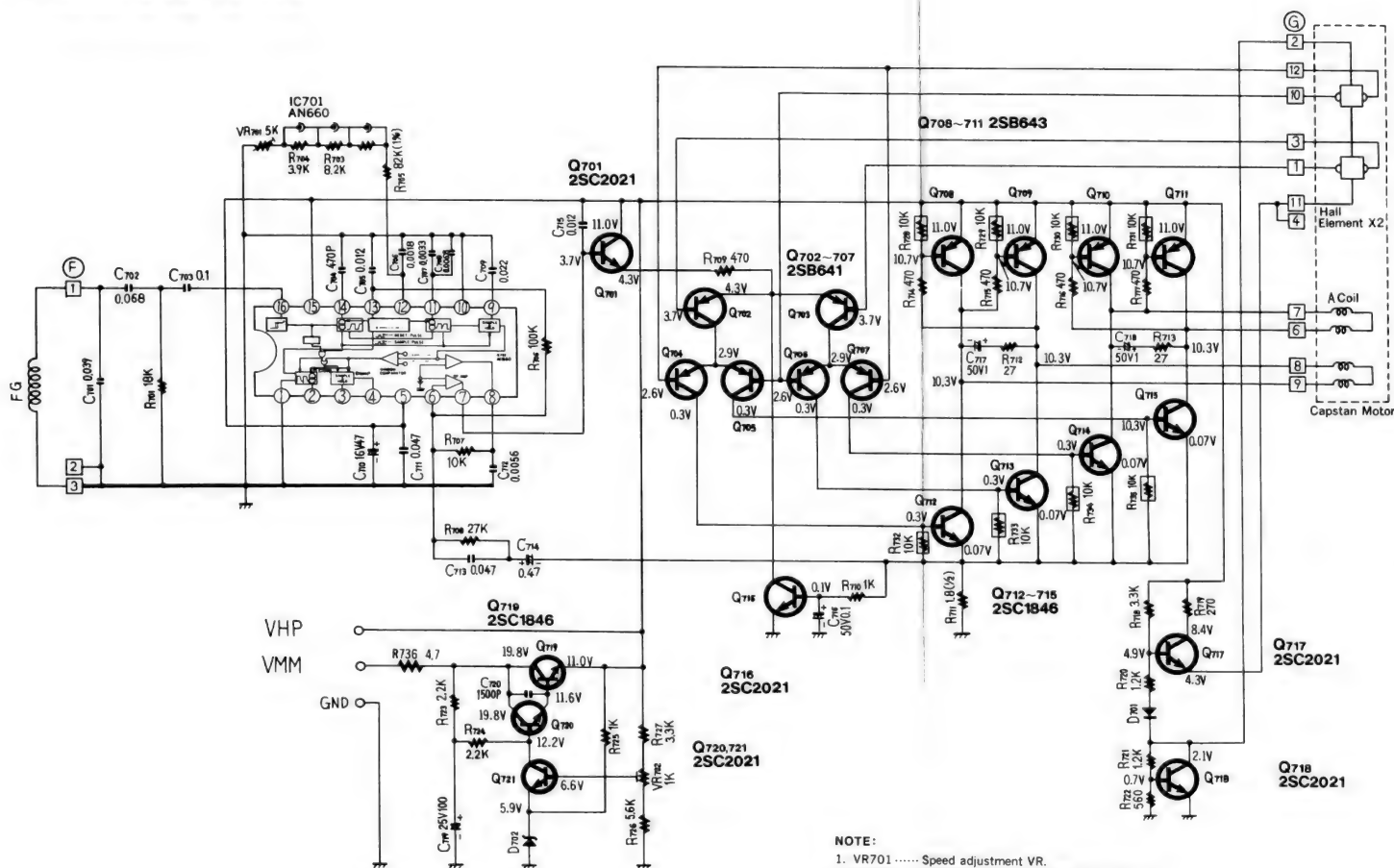



MUTING CIRCUIT BOARD



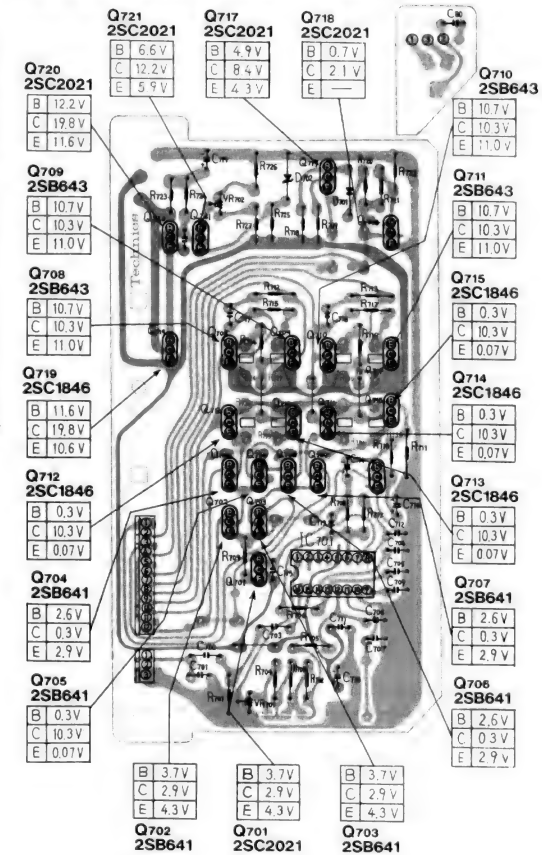
SCHEMATIC DIAGRAM

CAPSTAN DRIVING SECTION

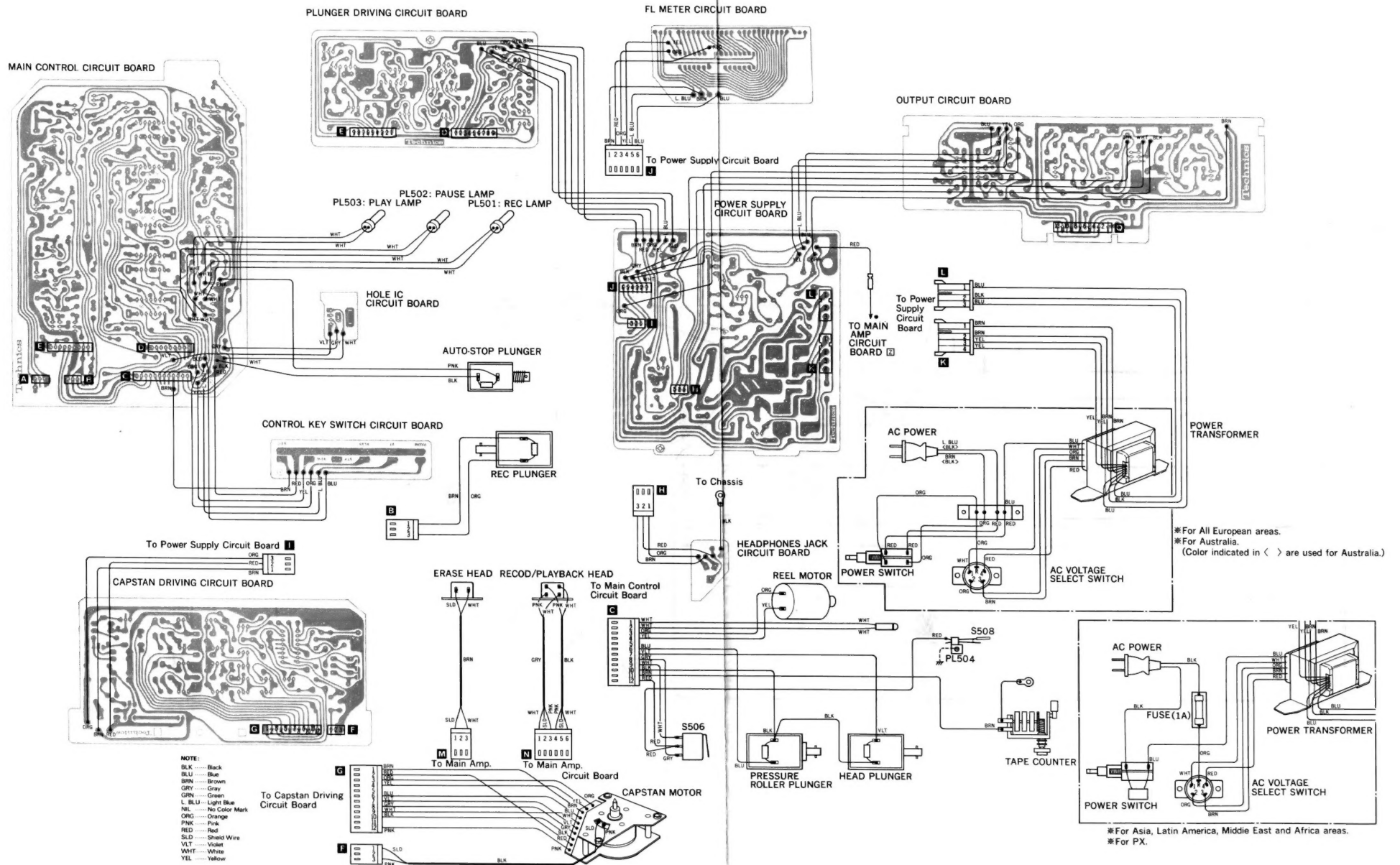


- NOTE:**
1. VR701 Speed adjustment VR.
 2. VR702 Standard DC power voltage adjustment VR.
 3. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.
K = 1,000.
 4. Capacitor values are in microfarads (μF) unless specified otherwise.
P = Pico-farads.
 5. All voltage values shown in circuitry under no signal condition with volume control at minimum position.
For measurement, use VTVM.
 6.  indicates printed resistor.

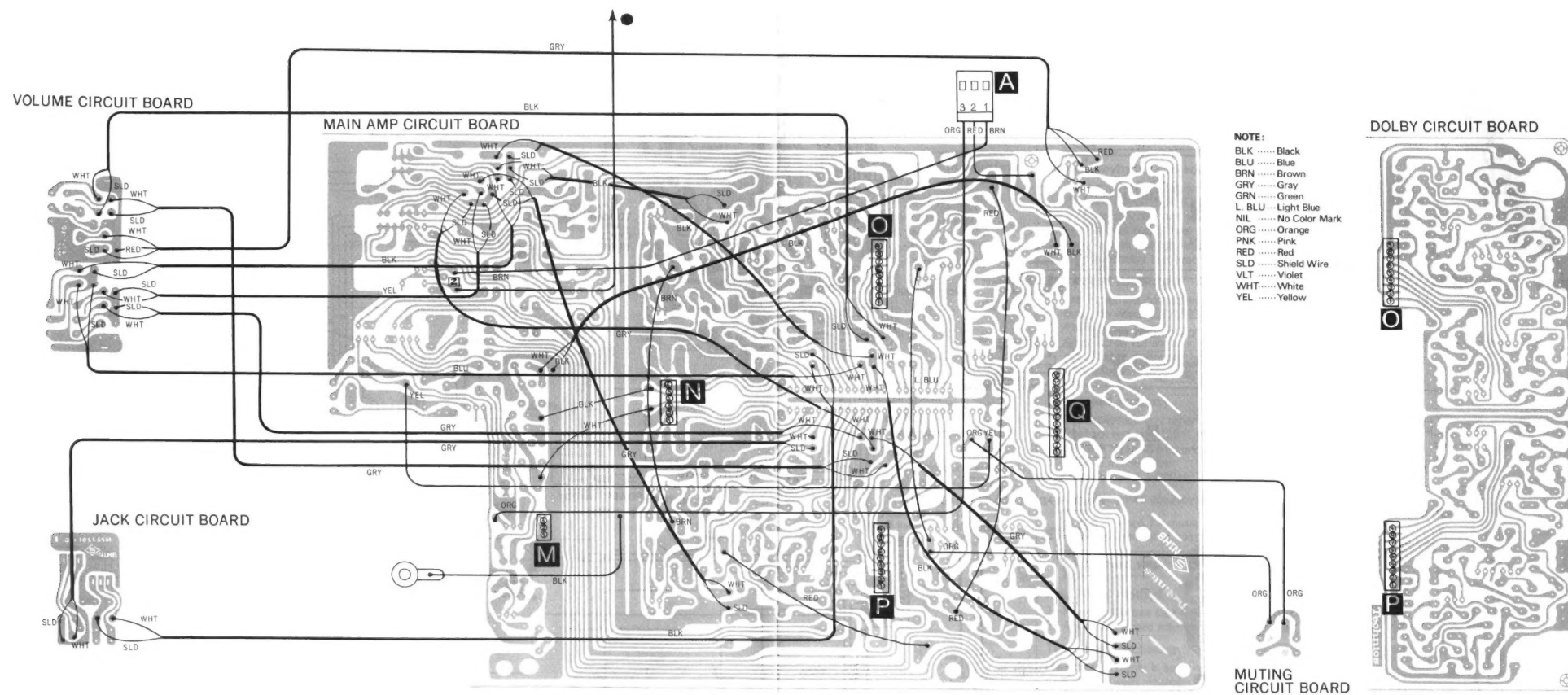
CAPSTAN DRIVING CIRCUIT BOARD



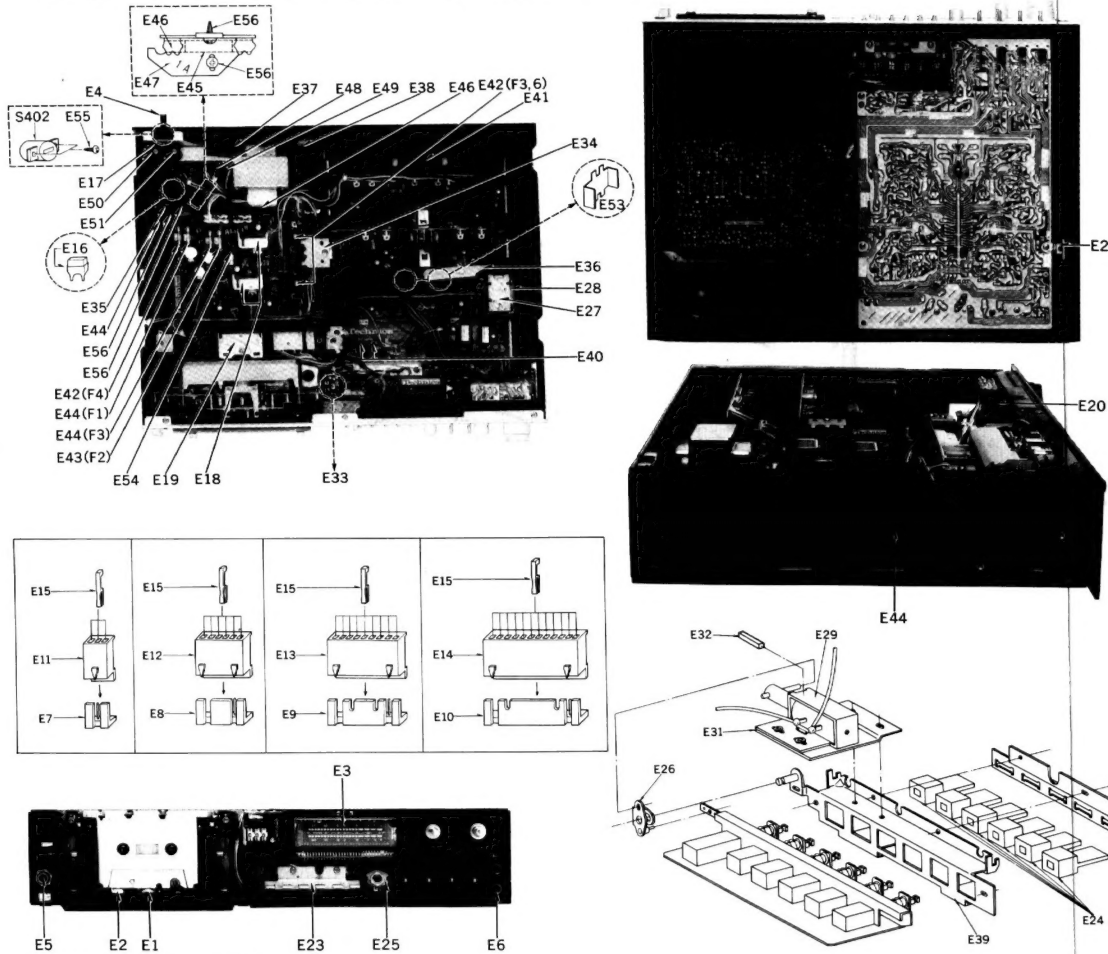
WIRING CONNECTION DIAGRAM



WIRING CONNECTION DIAGRAM



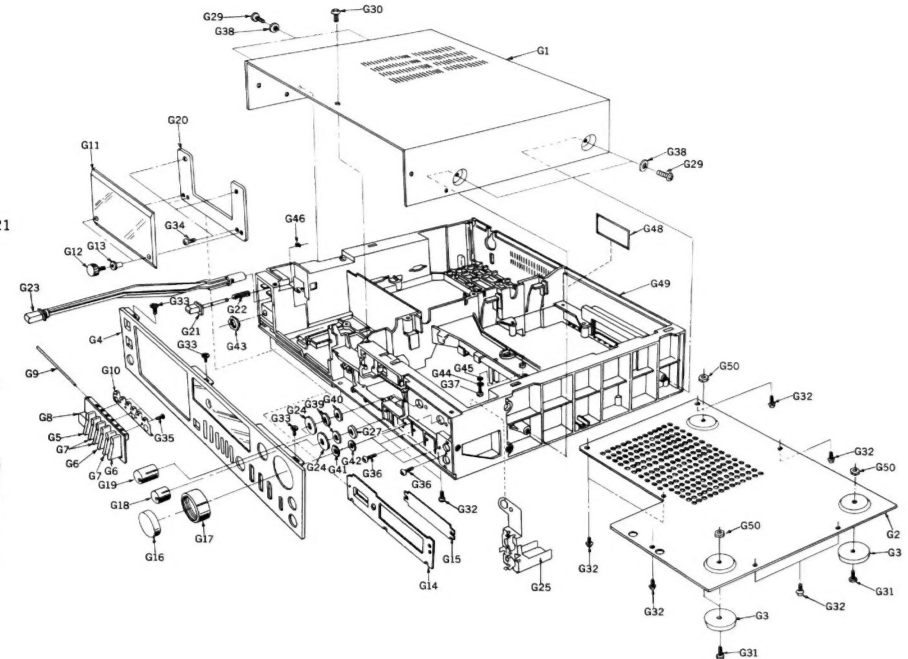
ELECTRICAL PARTS LOCATION



NOTE: Δ indicates that only parts specified by the manufacturer be used for safety.

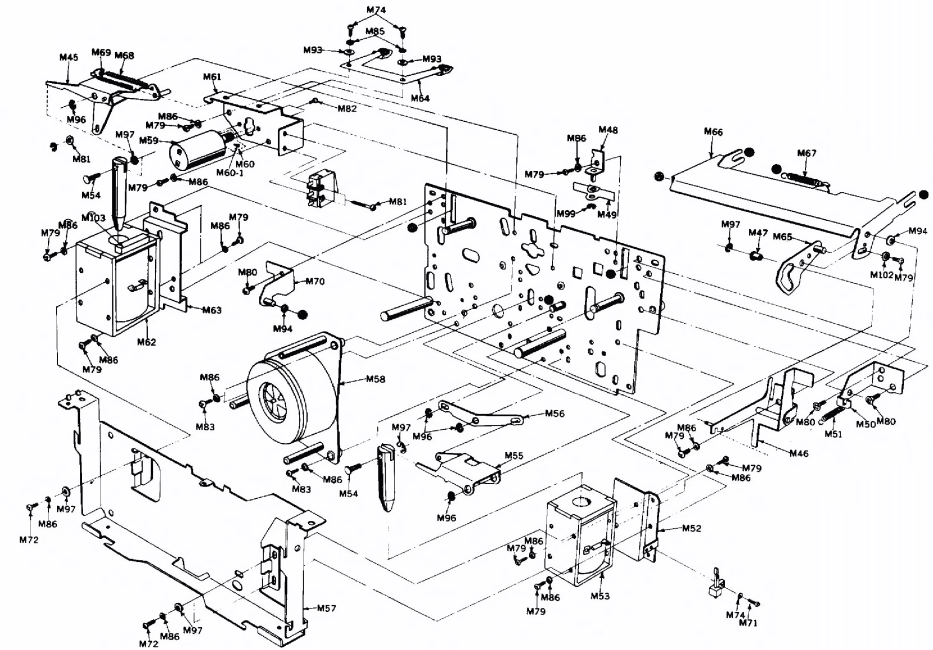
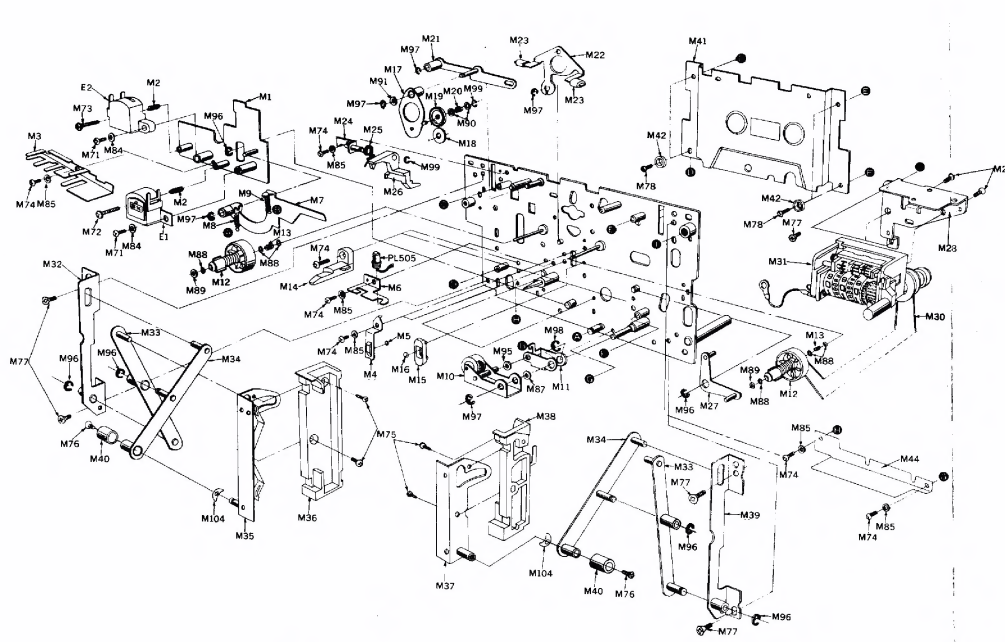
Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
ELECTRICAL PARTS											
E1	QWY41182A	Record/Playback Head	E14	QJ51924TN	12 Pin Socket	E28	QMF2021	Plunger Holding Plate	E46	QTF1033	Fuse Holder (1A)
E2	QWY21222B	Erase Head	E15	QJT1054	Contact	E29	QME0150	Auto-Stop Plunger	E47	QMA3122	Fuse Angle
E3	QSL5002RF	Fluorescent Level Meter	E16	QTW1118	Spark Killer Cover	E31	QMA3589	Plunger Holding Angle	E48	QMA3122	Fuse Angle
E4	QJC1203M	AC Power Cord	E17	QTD1129	Cord Bushing	E32	QBG1634	Cushion	E49	QJT4017	4 Pin Mold Terminal
E5	QJC1205M	"Black Type"	E18	QBI14255	"Silver Type"	E33	QMA3579	Hall Device Angle	E50	QTD1164	Cord Clamp
E6	QJC1204M	"Black Type"	E19	QTH1088	Heat Sink for Q402, 405	E34	QMA3580	P.B. Angle	E51	QXN3+85	Screw 3/8x8 (PH)
E7	QJC1203M	"Black Type"	E20	QTS1450	Shield Plate	E35	QMA3578	Power Angle	E52	QTD1164	Cord Clamp
E8	QJC1208M	"Black Type"	E21	QJC0020	Earth Plate-A	E36	QXL1244	Record/Playback Lever	E53	QTS1273	Shielding Board
E9	QJP1922TN	Headphones Jack	E22	QMA3590	Rod Guide	E37	QMA3577	Trans Angle	E54	QZ0003	Porcelain Tube
E10	QJP1923TN	Microphone Jack	E23	QMR1720	Control Rod	E38	QEQ1472	Shield Plate	E55	XTN3+68	Tapping Screw 3/8x6
E11	QJP1922TN	6 Pin Plug	E24	QMF2038	Correction Plate	E39	QXA0737	Switch Angle	E56	XTN3+88	Tapping Screw 3/8x8
E12	QJP1923TN	9 Pin Plug	E25	QML1245	Auto-Stop Lever	E40	QJT1067	Check Pin			
E13	QJS1924TN	12 Pin Plug	E26	QML1245	Auto-Stop Lever	E41	QJE3002S	Jack Board			
			E27	QME0147BK	Record Plunger	E42	QBA0013	Mini Fuse 1, 3 (1.6AT)			
						E43	QBA0008	Mini Fuse 2 (30mAAT)			
						E44	QBA0010	Mini Fuse 1, 3 (1.6AT)			
						E45	QBA0015	Fuse 401 (1A)			

CABINET PARTS



Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
CABINET PARTS								
G1	QGC1126K	Case Cover	G20	QGK2927K	Cassette Lid Holding Plate	G48	QGS2641	Main Name Plate
G2	QGC1126K	"Black Type"	G21	QGC2927	"Silver Type"	G49	QGS2666	"Black Type"
G3	QGC1126K	"Silver Type"	G22	QGO1504K	Eject Button		QGS2682	"Black Type"
G4	QKS1270	Bottom Cover	G23	QGO1504	"Silver Type"		QGS2683	"Silver Type"
G5	QKA1076	Rubber Foot	G24	QXB0630	Power Button Assembly		QYM0542	"Black Type"
G6	QYP0858	Front Panel Assembly	G25	QXB0606	"Black Type"		QYM0538	"Silver Type"
G7	QYP0846	"Black Type"	G26	QBJT0017	Spacer		XNG45	Nut
G8	QXB0528	Control Button (REC)	G27	QJC0021	Earth Plate-B	ACCESSORIES		
G9	QGO1416	Control Button (PLAY, PAUSE)	G28	QMF2038	Mounting Plate	A1	RP023A	Connection Cord
G10	QGO1503	Control Button (FF, REW, STOP)	G29	XYA4+BJ10K	Screw 4x10	A2	QQT2561	Instruction Book
G11	QMN1531	Button Shaft	G30	XSS3+8BV5	Screw 3x8		QQT2562	"Black Type"
G12	QBP1831	Button Spring	G31	XTN4+10B	Tapping Screw 5/4x10		QQT2563	"Silver Type"
G13	QGC2922	Cassette Lid	G32	XTN3+10B	Tapping Screw 5/3x10		QQT2605	"Black Type"
G14	QHQ1272	Cassette Lid Holder	G33	XTN3+8B	Tapping Screw 3/8x8		QQT2604	"Silver Type"
G15	QHQ1280	"Black Type"	G34	XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G16	QHB0551	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G17	QKJ0246	Cushion Rubber		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G18	QKJ0246	Meter Cover-A		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G19	QKJ0313	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G20	QGL1130	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G21	QYT0532	Meter Cover-B		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G22	QYT0503	Volume Knob-A Assembly		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G23	QYT0503	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G24	QYT0504K	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G25	QYT0504K	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G26	QYT0504	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G27	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G28	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G29	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G30	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G31	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G32	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G33	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G34	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G35	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G36	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G37	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G38	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G39	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G40	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G41	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G42	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G43	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G44	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G45	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G46	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G47	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G48	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"
G49	QYT0506	"Black Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Black Type"
G50	QYT0506	"Silver Type"		XN26+4	Tapping Screw 5/2x5		QQT2605	"Silver Type"

EXPLODED VIEWS



Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
MECHANICAL PARTS														
M1	QXK2029	Head Base Plate Assembly	M21	QXL1164	Brake Lever Assembly	M41	QXH0277	Mechanism Cover	M61	QMA3313	Motor Angle	M83	XSN3+8S	Screw $\varnothing 3 \times 8$
M2	QBCA0008	Head Spring	M22	QML3273	Brake	M42	QW1213	Spacer B	M62	QXE0243	Plunger	M84	XWA2	Spring Washer 2 ϕ
M3	QTD1261	Head Wires Clamp	M23	QBG1122	Stopper Rubber	M43	QBP1135	Spring Washer	M63	QMA3312	Plunger Angle-R	M85	XWA26	Spring Washer 2.6 ϕ
M4	QBP1733	Steel Ball Holder-A	M24	QXA0714	Detection Angle Assembly	M44	QTS1451	Mechanism Shield Plate	M64	QXH0276	Cassette Holding Cushion	M86	XWA3	Spring Washer 3 ϕ
M5	QDK1012	Steel Ball 2.5 ϕ	M25	QBN1573	Detection Lever Spring	M45	QXL1165	Lever-B Assembly	M65	QXL1173	Lock Lever Assembly	M87	QBW2015	Poly Washer
M6	QMA3321	Lamp Cover	M26	QML3285	Detection Lever	M46	QXL1188	Eject Lever Assembly	M66	QML3282	Connector Lever	M88	QBW2016	"
M7	QXL1168	Pressure Roller Lever Assembly	M27	QXL1172	Lever-A Assembly	M47	QDP1756	Roller	M67	QBT1553	Holder Spring-R	M89	QBW2008	"
M8	QBT1490	Eject Lever Spring	M28	QMA3588	Counter Angle	M48	QXA0713	Angle Assembly	M68	QBT1405	Lever Spring			
M9	QBT1441	Pressure Roller Spring	M29	XSS3+8S	Screw $\varnothing 3 \times 8$	M49	QML3284	Release Lever	M69	QBT1713	Record Spring	M90	QBW2015	"
M10	QXL1166	Pressure Roller Assembly	M30	QDB0215	Counter Belt-B	M50	QMA3314	Connector Angle	M70	QXA0702	Connector Angle-R Assembly	M91	QBW2017	"
M11	QML3267	Pressure Roller Lever-L	M31	QXA0768	Tape Counter Assembly	M51	QBT1753	Playback Lever Spring	M71	XSN2+6	Screw $\varnothing 2 \times 6$	M92	QBW2018	"
M12	QXD0087	Reel Table		QXA0744	"Black Type"	M52	QMA3591	Plunger Angle-L	M72	XSN3+6S	Screw $\varnothing 3 \times 6$	M93	XWG26	Fiber Washer
M13	QBC1272	Back Tension Spring		QXA0744	"Silver Type"	M53	QME0141	Plunger	M73	QHQ1230	Head Adjustment Screw	M94	QBW2019	Poly Washer
M14	QMG0054	Cassette Guide	M32	QXA0703	Angle-L Assembly	M54	QMN2095	Plunger Pin	M74	XWA28	Washer	M95	QBK1123	Fiber Washer
M15	QMH2009	Steel Ball Holder-B	M33	QXL1191	Link Lever-A Assembly	M55	QXL1171	Plunger Lever-L Assembly	M75	XSN26+4BVS	Screw $\varnothing 2.6 \times 4$	M96	XUC3F	Stop Ring 3 ϕ
M16	QDK1006	Steel Ball 3 ϕ	M34	QXL1190	Link Lever-B Assembly	M56	QML3276	Plunger Lever	M76	XSS2+4	Screw $\varnothing 2 \times 4$	M97	XWG3	Fiber Washer
M17	QXL1189	Idle Lever Assembly	M35	QXA0706	Holder Angle-L Assembly	M57	QXA3591	Reinforcement Angle	M77	XSS3+4S	Screw $\varnothing 3 \times 4$	M98	XUC5F	Stop Ring 5 ϕ
M18	QBT1260	Idle Felt	M36	QMH2027	Cassette Holder-L	M58	QXK2121	Captain Motor Assembly	M78	QHQ1185	Step Screw	M99	XUC2F	Stop Ring 2 ϕ
M19	QX10101	Idle Assembly	M37	QXA0705	Holder Angle-R Assembly	M59	MKCN22AE5	Reel Motor	M79	XSN3+5S	Screw $\varnothing 3 \times 5$	M100	XSN26+6	Screw $\varnothing 2.6 \times 6$
M20	QBC1308	Idle Spring	M38	QMH2028	Cassette Holder-R	M60	QXP0574	Motor Pulley Assembly	M80	XSS3+6S	Screw $\varnothing 3 \times 6$	M101	XWG26	Flat Washer
			M39	QXA0704	Angle-R Assembly	M60-1	XXE26D3FZ	Set Screw	M81	QBK7123	Washer	M102	XWC3	Lock Washer
			M40	QXK0245	Spacer-A				M82	XSN2+3	Screw $\varnothing 2 \times 3$	M103	QBG1634	Rubber Cushion

SPECIFICATIONS

Pressure of pressure roller	400 \pm 30 gr
Takeup tension (Use cassette torque meter ... QZZSRKCT)	45 \pm 15 gr-cm
Wow and flutter (Test tape ... QZZCWAT)	Less than 0.04% (WRMS)